UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

WI-LAN, INC. Plaintiff, v. ACER, INC., et al. Defendant;	)	CIVIL ACTION NO. 2:07-CV-473 **CONSOLIDATED THROUGH MARKMAN WITH:**
WI-LAN, INC. Plaintiff, v. WESTELL TECHNOLOGIES, INC., et al. Defendant.	)	CIVIL ACTION NO. 2:07-CV-474 HON. T. JOHN WARD JURY
WI-LAN, INC. Plaintiff, v. RESEARCH IN MOTION CORPORATION, et al. Defendant;	)	CIVIL ACTION NO. 2:08-CV-247 HON. T. JOHN WARD JURY

<u>DEFENDANTS' RESPONSIVE CLAIM CONSTRUCTION BRIEF</u>

TABLE OF CONTENTS

Page

TABLE OF AUTHORITIES

Page(s)

Cases

Statutes

INTRODUCTION

The claim construction issues for the Court's resolution arise from a key difference between how Defendants[1] approach claim construction, on the one hand, and how Plaintiff Wi-LAN approaches it, on the other. Defendants' constructions derive from the intrinsic claim language and specification for U.S. Patent No. 5,282,222 (the "'222 patent") and RE37,802 (the "'802 patent"). Plaintiff, by contrast, relies on voluminous expert declarations on nearly every claim term to change the claim language and intrinsic record, an approach the Federal Circuit specifically condemns. *See*, *e.g.*, *Phillips v. AWH Corp.,* 415 F.3d 1303 (Fed. Cir. 2005).

Plaintiff relies so heavily on extrinsic expert testimony that it avoids any meaningful overview of how the '222 and '802 patents describe the claimed inventions. Plaintiff also avoids key passages in the specification and does not even mention the critical documents in the intrinsic evidence defining the very terms in dispute. Accordingly, in this brief, Defendants begin by providing the Court with an overview – rooted in the intrinsic record – of what the patents actually describe and claim as their alleged inventions. Defendants then provide their proposed constructions, which comport with the specific, detailed intrinsic evidence.[2]

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[1] Defendants include 2Wire, Inc., Acer America Corporation, Apple Inc., Atheros Communications, Inc., Belkin International, Inc., Broadcom Corporation, D-Link Systems, Inc., Dell, Inc., Gateway, Inc., Hewlett-Packard Company, Intel Corporation, Marvell Semiconductor, Inc., Lenovo (United States) Inc., Netgear, Inc., Sony Electronics, Inc., Sony Computer Entertainment America, Inc., Toshiba America Information Systems, Westell Technologies, Inc., Motorola, Inc., UTStarcom, Inc., LG Electronics Mobilecomm U.S.A., Inc., and Personal Communications Devices, LLC (collectively "Defendants").

[2] Attached as Exhibit 1 is a claim construction comparison chart with the parties' respective proposed constructions for the terms in dispute. Additionally, the chart provides cross-reference information to the parties' P.R. 4-3 claim construction charts as well as the pages in the parties' briefs where the arguments on those constructions may be found. As reflected in Exhibit 1, to streamline the claim construction process for the Court, Defendants have grouped claim terms that present similar issues. Although Defendants provide constructions herein for the disputed terms, Defendants reserve all rights to assert any defenses under 35 U.S.C. § 112.

I. OVERVIEW OF THE ’222 PATENT

At the heart of the ’222 patent are four core features which the patent applicants emphasized are critical to the alleged invention: (1) a technique referred to in the patent as “wideband OFDM,” which the applicants distinguished from prior art OFDM techniques; (2) the use of a special type of modulation, called “differential” modulation; (3) a specialized channel estimator designed to work with differential modulation; and (4) a patented transceiver that is smaller, more portable, and consumes less power than prior art transceivers because it omits several key, prior art components.

A. The ’222 Patent’s Wideband OFDM Technique

The central aspect of the ’222 patent’s alleged invention is use of a technique referred to in the patent as wideband OFDM. According to the ’222 patent, traditional OFDM techniques for transmitting data – which existed for many years and were well-known in the art[3] – involve dividing a particular frequency bandwidth or range (“B”) by a number of points (“K” points) to form subchannels each having a fraction of the overall frequency bandwidth (“Δf”):

> In OFDM, the entire available bandwidth B is divided into a number of points K, where adjacent points are separated by a frequency band Δf, that is B=KΔf.

See Exh. 2 at col. 5:26–29; *see also id.* at col. 7:11–15. According to the patent, to correct for errors relating to clock signals and the carrier frequency offset (or offset error), prior art transceivers implementing OFDM required the use of “clock recovery” and “carrier recovery” devices. *See id.* at cols. 4:44–55, 5:50–6:29.

To avoid using clock and carrier recovery, the ’222 patent proposes an allegedly new “wideband” modulation scheme based on OFDM, referred to as “wideband OFDM” or

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[3] These well-known prior art OFDM techniques are discussed in numerous references cited during prosecution and appearing on the face of the ’222 patent. *See, e.g.*, Exh. 3; Exh. 4.

"W-OFDM." *See id.* at col. 5:20–26 ("The present invention proposes in one embodiment **a wideband modulation scheme . . . . Wideband in this patent document is described in the context of Wideband-Orthogonal Frequency Domain Modulation (W-OFDM or wideband OFDM)**.").[4] At the core of wideband OFDM is the use of "wideband frequency channels," which, like traditional OFDM channels, are subdivided into K points separated by a subchannel frequency band Δf. *See id.* at cols. 5:26–29, 7:11–15. However, unlike traditional OFDM, the number of K points and subchannel width Δf in wideband OFDM are selected to be sufficiently large to minimize certain errors, such as clock error, Doppler shift and other sources of frequency offset, which would otherwise require the use of clock or carrier recovery:

> In wideband-OFDM, both K and Δf are selected sufficiently large to achieve a high throughput as well as to reduce the effects on the B[it] E[rror] R[ate] of the clock error, the Doppler shift and the frequency offset between the LO [Local Oscillator] in the transmitter and the one in the receiver.

See id. at col. 5:55–59. To confirm this fundamental point, the applicants distinguished traditional OFDM on that basis in the specification itself, *expressly defining* "wideband OFDM" as OFDM with a K and Δf large enough to avoid using either clock or carrier recovery:

> In summary, **OFDM with a K and Δf large enough** to be able to achieve a specific throughput and large enough to be able **to avoid using either a clock or a carrier recovery device without substantially affecting the BER is referred to here as *Wideband-OFDM*.**

See id. at col. 6:30–34. In defining their alleged invention in this manner, the applicants placed no qualifications on the types of clock or carrier recovery that could be avoided – rather, as repeated throughout the specification, the focal point of wideband OFDM is to avoid clock or carrier recovery altogether. *See id*. at cols. 5:55–59, 6:30–34. To ensure that the claims incorporated this core aspect of the alleged invention, the apparatus claims require a "wideband"

[4] Emphasis added unless otherwise indicated.

frequency division multiplexer for multiplexing information onto “wideband” frequency channels, and the method claims require that K and Δf are chosen “so that neither carrier nor clock recovery is required . . . .” *See id.* at Claims 1, 7.

B. The ’222 Patent’s Use Of Differential Modulation And A Channel Estimator To Estimate Differentials

It is well-known in the art that the term “differential” refers to the differences between adjacent symbols the receiver receives. Throughout the intrinsic record, the applicants repeatedly confirm that well-known definition of “differential”:

> A differential of a sequence of symbols or data points is a measure of the time rate of change of a sequence of symbols or data points. For digital signals, which are of most interest here, the time interval between symbols may be assumed to be fixed so that while **the differential is a measure of the rate of change, it may be estimated as a difference between symbols or data points.**

See Exh. 5 at col. 4:3–10; *see also id.* at col. 4:10–13 (“As applied in this disclosure, the preferred differential is the **difference between adjacent (consecutive) symbols.”)**.

Claim 1 includes two phrases that use the term “differential” consistent with its well-known meaning. First, the claim requires signals having “differential characteristics,” which refers to characteristics of the signal resulting from the use of “differential modulation,” a modulation scheme that encodes information in the ***differences between received data symbols.*** *See, e.g.,* Exh. 2 at Abstract; cols. 2:61–64, 4:26–31, 5:31–35, 7:15–27. Second, to perform channel estimation[5] on the signals having “differential characteristics,” claim 1 requires a channel estimator that estimates “one or both of an estimated amplitude and an estimated phase

[5] Channel estimation techniques – which were well-known in the prior art long before the ’222 patent – are used to estimate the effects of the channel on the transmitted signal. *See, e.g.,* Exh. 2 at col. 9:43–48; Declaration of Dr. Acampora in Support of Defendants’ Responsive Claim Construction Brief (“Acampora Decl.”) at ¶30; Exh. 6. at 66:7–68:12.

differential," which likewise refers to an estimate of the ***differences between received data symbols***. *See* Exh. 2 at Claim 1; col. 11: 14–19, 11:30–34; Exh. 5 at col. 4:3–13, 4:53–61.

C. Omission Of Prior Art Transceiver Components

The '222 patent distinguishes prior art transceivers on the basis that, unlike the claimed transceiver, the prior art requires use of components that the alleged invention omits:

> The system, as compared with prior art systems omits the clock or carrier recovery, automatic gain control or passband limiter, power amplifier, an equalizer or an interleaver-deinterleaver, and therefore has low complexity.

See Exh. 2 at col. 2:19–23. By omitting these prior art components, the claimed transceiver had a "reduced complexity," which allowed for a smaller, lighter and more power efficient device. *See id*. at cols. 1:43–49, 2:19–23. To emphasize the importance of this aspect of the alleged invention, the applicants recited this distinction throughout the specification: in the Summary of the Invention, Detailed Description, and even by contrasting the '222 patent's transceiver with the prior art in the patent's figures. *Compare* Fig. 1 (showing components in prior art systems) *with* Figure 5 (showing the claimed system which omits prior art components). Hence, the applicants clearly disavowed coverage of devices incorporating these items to obtain their patent.

II. CONSTRUCTION OF THE DISPUTED TERMS IN THE '222 PATENT[6]

A. "A Wideband Frequency Division Multiplexer For Multiplexing The Information Onto Wideband Frequency Channels"

The parties agree that "wideband" should be construed in accordance with the applicants' express definition for that term.[7] Defendants' proposed construction adopts the applicants' definition verbatim. By contrast, Wi-LAN proposes three primary modifications to the

[6] Wi-LAN asserts six claims of the '222 patent (claims 1–3 and 7–9).

[7] Following the 4-3 Joint Claim Construction Statement, Wi-LAN amended its proposed claim construction for "a wideband frequency division multiplexer . . ." to more closely match Defendants' proposed construction, which substantially limits the points of dispute between the parties with respect to this phrase. *Compare* Exh. 7 (Wi-LAN's P.R. 4-3 disclosure) *with* Br. at 12.

applicants' express definition: (1) replacing "multiplexer for multiplexing information onto" with "a device for placing information onto;" (2) substituting "K" with "frequencies;" and (3) substituting "Δf" with a "frequency range between frequencies."

With respect to the "multiplexer for multiplexing" limitation, Wi-LAN's proposed construction, premised exclusively on expert testimony, conflicts with the well-known meaning of the term multiplexer by redefining "multiplexing" as "placing." *See, e.g.*, Exh. 8 (showing numerous dictionary definitions of the terms multiplexer and multiplexing). In fact, Wi-LAN concedes that "multiplexing" involves more than merely "placing information onto." *See* Br. at 13 ("'Frequency division multiplexing' is ***a method for transmitting information in parallel*** . . . ."); Acampora Decl. at ¶ 19–21.[8]

B. "Carrier Recovery" And "Clock Recovery"

1. The Intrinsic Record Supports Defendants' Construction

The terms "clock recovery" and "carrier recovery" are used in the '222 patent to define the patent's alleged wideband OFDM invention: *i.e.,* W-OFDM is OFDM with K and Δf large enough to avoid "clock recovery" and "carrier recovery" devices. This exclusion of "carrier recovery" and "clock recovery" is found in both of the independent claims: (1) in claim 1, as part of the definition of "wideband frequency division multiplexer;" and (2) in claim 7, in the final claim element. *See* Exh. 2 at Claims 1, 7.

[8] With respect to "K," Wi-LAN proposes to add additional language defining that term as "frequencies." Since the parties appear to agree that K refers to "points" (*see* Br. at 14, 18–19), the issue is whether "points" means "frequencies," as Wi-LAN proposes, or whether it is more properly construed as "divisions within a frame corresponding to one information symbol each." (*Id. at* 17–19). According to the specification, "the entire available bandwidth B is divided into a number of points K" which "are grouped into a frame," and "each point in the frame corresponds to one information symbol." *See* Exh. 2 at col. 5:26–36. Similarly, with respect to Δf, the '222 patent expressly defines that term as the frequency band separating each of the "K" points. *See id.* at col. 5:26–29.

According to the patent, wideband OFDM is able to reduce the effects of errors – such as "clock error," "Doppler shift," and "frequency offset" – resulting from differences in the clock and carrier signals in the transmitter and receiver. *See id.* at col. 5:55–59 ("In wideband-OFDM, both K and Δf are selected sufficiently large to . . . reduce the effects on the BER of the clock error, the Doppler shift and the frequency offset . . . ."). Ordinarily, according to the applicants, the receiver must be capable of recovering the clock and carrier signals from the transmitter to address these issues. *See id.* at cols. 2:19–23, 4:44–63. By reducing the effects of these types of errors, however, W-OFDM is able to avoid using clock or carrier recovery. *See id.*

Contrary to Wi-LAN's assertions, the '222 patent does not limit the type of clock or carrier recovery that is avoided through use of W-OFDM – instead, both the claims and specification repeatedly confirm that W-OFDM is able to avoid clock or carrier recovery without placing any restrictions on the type of clock or carrier recovery avoided. *See, e.g., id.* at claim 7 ("whereby the width of the frequency band is chosen so that ***neither carrier nor clock recovery is required*** at the second transceiver"), cols. 2:19–23 ("The system, as compared with prior art systems omits the clock or carrier recovery"), 4:55–63 ("With implementation of the present invention, several of the blocks shown in FIG. 1 are not required. These are the . . . clock recovery 136 and carrier recovery 132 . . . ."), 6:30–33, 12:45–50. Defendants' proposed constructions are consistent with this fundamental aspect of the alleged invention – *i.e.,* avoiding clock or carrier recovery – by defining the two terms consistent with all the intrinsic evidence; *i.e.*, without restriction.

2. Wi-LAN's Construction Improperly Attempts To Limit The Claim Terms With Expert Testimony And Conflicts With The Evidence

Wi-LAN's proposed constructions place numerous limitations on clock and carrier recovery found nowhere in the patent, and, more importantly, are an attempt to improperly

restrict those functions to only one of the many ways of performing them that were well-known at the time the ’222 patent’s application was filed. *See* Exh. 2 at col. 4:44–63; Br. at 24. As an initial matter, there is no text in the ’222 patent that defines clock and carrier recovery in the manner proposed by Wi-LAN. *See* Exh. 6 at 152:21–153:9. With no support in the specification’s text, Wi-LAN relies instead on expert testimony to limit the scope of these claim terms, including an interpretation of Figure 1b that is not only absent from the specification, but in fact contradicts it. *See id.* The description of Figure 1b states only that “clock recovery and carrier recovery” are omitted without impairing the system, and does not place any further limitations on those terMs. *See, e.g.*, Exh. 2 at col. 4:55–63. Because expert testimony ***may never*** be used to vary the intrinsic record, particularly where the applicants have expressly defined their alleged invention without the further limitations proposed by Wi-LAN, Wi-LAN’s extrinsic evidence should be discounted entirely. *See Phillips*, 415 F.3d at 1318; *Johnson Worldwide Assocs., Inc. v. Zebco Corp.,* 175 F.3d 985, 992 (Fed. Cir. 1999).

Moreover, as conceded by ***both*** of Wi-LAN’s experts in deposition, Wi-LAN’s proposed constructions for clock and carrier recovery are limited to only one of the many ways that were known for years prior to the ’222 patent to perform those functions. *See* Acampora Decl. at ¶22–23; Exh. 9 at 188:21–189:12 (identifying multiple ways to perform clock and carrier recovery); Exh. 6 at 159:2–160:6 (admitting that many ways of performing clock and carrier recovery existed in the prior art). In fact, in the same year the ’222 patent was filed, one of Wi-LAN’s experts (Dr. Gitlin) published a book surveying the art entitled *Digital Communications Principles*, which devotes an entire chapter to clock and carrier recovery and illustrates numerous well-known techniques to perform those functions ***without*** necessarily “synchronizing the local oscillator to the carrier frequency of the received signal” or “synchronizing the

sampling clock to the timing of the received signal" as proposed by Wi-LAN. *See* Exh. 11 at Ch. 6; Exh. 9 at 188:21–189:12 (Dr. Gitlin confirming that carrier recovery could be implemented by feeding a signal back into a local oscillator or in many other ways); Exh. 6 at 191:8–194:13 (Dr. Haimovich agreeing with Dr. Gitlin's testimony). Notably, Wi-LAN's second expert Dr. Haimovich relies on an excerpt from this book, but omits the pages showing clock and carrier recovery being performed in other ways. *Compare* Wi-LAN's Exhibit G *with* Exhibit 11 at 427–28.

Wi-LAN's other extrinsic texts are also inconsistent with Wi-LAN's proposed limitations on the scope of clock and carrier recovery, and confirm Defendants' proposed construction. For instance, in *Electronic Communications Systems* by Wayne Tomasi, carrier recovery is defined as "the process of extracting a phase coherent reference carrier from a received carrier waveform." *See* Exh. 12 at 529. In deposition, Wi-LAN's expert Dr. Haimovich conceded that this is a proper definition of carrier recovery, even though this definition does not require the additional step of "synchronizing the local oscillator to the carrier frequency of the received signals," as Wi-LAN proposes. *See* Exh. 6 at 154:16–155:25. Dr. Haimovich also conceded that Tomasi illustrates clock recovery ***without*** the additional step of "synchronizing the sampling clock to the timing of the received signals." *See id.* at 168:14–169:8. Indeed, numerous other approaches to clock and carrier recovery existed and were well-known at the time the '222 patent was filed, including well-known techniques that Wi-LAN's expert admitted he was not aware of. *See* Exh. 10 at 322; Exh. 12 at Fig. 13-37; Exh. 13 at 501; Exh. 26 at 433; Acampora Decl. at ¶¶22–23; Exh. 6 at 173:25–174:13 ("I'm not familiar with the specific technique for clock recovery called interpolation."); Exh. 11 at 427–28; Exh. 27 at 9–10, 13–14, 313, 315–16.

Wi-LAN's reason for seeking to include additional limitations on "clock recovery" and "carrier recovery" is obvious: Wi-LAN hopes to import these limitations into its construction for "wideband" to change the explicit definition of that term provided in the specification. *See* Exh. 2 at col. 6:29–34. In marked contrast to the applicants' alleged W-OFDM invention, Wi-LAN's proposed construction of W-OFDM would only need to avoid *certain forms* of the clock and carrier recovery methods that were well-known in the art at the time the '222 patent application was filed:

Applicants' Definition For W-OFDM	Wi-LAN's Definition For W-OFDM
OFDM with a K and a Δf large enough to be able to achieve a specific throughput and large enough to be able to avoid using either **a clock or a carrier recovery device** without substantially affecting the BER.	OFDM with a K and a Δf large enough to be able to achieve a specific throughput and large enough to be able to avoid using either **synchronizing the sampling clock to the timing of the receiving signal or synchronizing the local oscillator to the carrier frequency of the received signal** without substantially affecting the BER.

Compare Exh. 2 at col. 6:29–34 with Br. at 23. Wi-LAN's proposed approach attempts to substantially modify the '222 patent's express definition of the critical "wideband" feature of the claimed invention by improperly importing unjustified limitations into the constructions of clock and carrier recovery. In an attempt to conceal that strategy, Wi-LAN discusses "wideband" and "clock and carrier recovery" apart from each other at opposite ends of its brief, as if they were unrelated to one another. *See* Br. at 12–14 and 23–26.

C. "Differential" Terms[9]

1. The Intrinsic Record Supports Defendants' Construction

[9] Claim 1 includes two phrases using the term "differential": first, the preamble requires signals having "***differential characteristics***"; and second, a "channel estimator for estimating one or both of the amplitude and the phase ***differential of the received signals*** . . . ." is required.

Contrary to Wi-LAN's assertions, the term "differential" in the context of the '222 patent does not refer to "distortion" (a different word which is used throughout the specification of the patent). Rather, "differential" refers to differences between symbols that the receiver receives. In a co-pending application the applicants filed and referenced during prosecution of the '222 patent,[10] the applicants confirmed that "differential" refers to a measure of changes over time in a sequence of data symbols:

> A differential of a sequence of symbols or data points is a measure of the time rate of change of a sequence of symbols or data points.

See Exh. 5 at col. 4:3–6. According to the applicants, these changes may be "estimated as a difference between symbols":

> For digital signals, which are of most interest here, the time interval between symbols may be assumed to be fixed so that while **the differential is a measure of the rate of change, it may be estimated as a difference between symbols or data points.**

See id. at col. 4:6–10. In other words, "differential" as used in the '222 patent refers to differences in consecutive symbols. *See id.* at col. 4:10–13 ("As applied in this disclosure, the preferred differential is the **difference between adjacent (consecutive) symbols."**).[11]

With respect to a signal having "differential characteristics," the applicants repeatedly confirmed that this refers to the use of differential modulation – *i.e.*, a signal in which information is encoded in the differences between sequential data symbols. For example, in the

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[10] In response to an Office Action during prosecution of the '222 patent, the applicants referenced a co-pending application they had filed (which issued as U.S. Patent No. 5,369,670), to describe the claimed channel estimation technique. *See* Exh. 14 at Apr. 19, 1993 Information Disclosure Statement (W0000297) ("The pending application [for the '670 patent] is relevant to the extent that it includes a description of the phase estimation technique disclosed in the present application"). The description of the channel estimator found in the '670 patent is intrinsic evidence. *See, e.g.*, *Callaway Golf Co. v. Acushnet Co.*, 576 F.3d 1331, 1346 (Fed. Cir. 2009); *Sys. Division, Inc. v. Teknek LLC*, 59 Fed. Appx. 333, 340 (Fed. Cir. 2003).

[11] Adjacent symbols may be referred to in a number of other ways, such as "consecutive symbols," "sequential symbols," or "received symbols." *See* Acampora Decl. ¶27 n.2.

paragraphs defining the basic principles underlying wideband OFDM, the specification states that differential modulation is used. *See, e.g.*, Exh. 2 at col. 5:31–35 ("The frame carries the information intended for transmission under the form of multilevel ***differential*** **phase shift keying (MDPSK) symbols or *differential* quadrature amplitude modulated (DQAM) symbols**."). The centrality of differential modulation to the invention is confirmed throughout the remainder of the specification, in every embodiment. *See, e.g.*, *id.* at cols. 2:63–64 ("the information being **differentially encoded using phase shift keying**."), 7:15–27 ("[T]he effect of phase distortion is reduced by employing **differential phase modulation.** Hence the modulation may be referred to as **Differential OFDM (DOFDM).**"); Exh. 5 at col. 4:26–31 ("The information in the carrier signal may be carried in the **phase *differential* of a number of consecutive time instants, or as *differential* phase shifts of a number of frequency components of the transmitted signal."**).

The use of differential modulation is particularly critical in connection with wideband OFDM because, according to the specification, differential modulation reduces the effects of phase distortion. *See* Exh. 2 at col. 7:15–27. As such, carrier recovery is not necessary in systems using differential modulation. *See* Exh. 6 at 162:17–163:5; Exh. 12 (Tomasi) at 530; Acampora Decl. at ¶29. This was confirmed by Wi-LAN's expert, and is emphasized in the specification as a reason to use differential modulation over non-differential techniques. *See id.*; Exh. 2 at col. 7:23–25 ("pilot tones" which are used to perform carrier recovery are not required in differential modulation). The ability of differential modulation to avoid carrier recovery is closely tied to achieving wideband OFDM, as that term was defined by the applicants.[12]

[12] Contrary to Wi-LAN's assertions, the '222 patent ***never*** suggests that non-differential forms of modulation may be used in connection with the claimed invention. *See* Br. at 11–12; Exh. 6 at 229:15–24. Rather, as Wi-LAN's expert confirmed, the passages relied upon by Wi-LAN concern the choice of whether to use amplitude (Continued…)

Contrary to Wi-LAN's assertions, differential modulation is not merely a preferred embodiment, but is included as an express requirement of the claims and an essential part of the alleged invention.

Claim 1 also requires a channel estimator for estimating an "amplitude or phase differential" – *i.e.*, an estimate of the difference in amplitude or phase of the received signals – to address the impact of the effects of the channel on a system using differential modulation. *See* Exh. 2 at col. 19:32–36; Exh. 5 at col. 4:3–10. The channel estimator of the '222 patent first obtains an estimated amplitude "differential," which is then used to obtain an estimated phase "differential" to correct for the channel's effects on the received signal. *See* Exh. 2 at col. 11:10–19; Exh. 5 at col. 2:60–68. Consistent with Defendants' proposed constructions, the applicants confirmed "amplitude differential" is the difference in amplitude between the "current" and "preceding" symbols:

> **[T]he preceding sample A(n-1)** is subtracted from **the current one, A(n),** and the **difference thus obtained is divided by the current sample to produce a differential of the logarithm of the amplitude samples.**

See Exh. 5 at col. 4:53–61; *see also* Exh. 2 at col. 11:3–6, 11:30–34. Likewise, the phase differential is the difference in the phase between samples, and is estimated by applying a "Hilbert transform" to the amplitude differential. *See* Exh. 2 at col. 11:14–19; Exh. 5 at col. 4:67–5:23; *see also* Figs. 7a, 7b (flow charts showing the operation of channel estimator).[13]

modulation or phase modulation, ***not*** whether to use differential modulation. *See* Exh. 2 at col. 7:24–27 ("Possibly, quadrature amplitude modulation might be used, **but amplitude modulation makes it difficult to equalize the distorting effects of the channel on the signal."**).

[13] During prosecution, the applicants specifically relied on the claimed differential estimation feature to overcome prior art. *See* Exh. 14 ("**The QAM encoder of Cases [sic] et al. is not mentioned as carrying out phase differential estimation**.").

The use of differential modulation and estimating differentials go hand-in-hand – differential modulation is used to encode information in the differences between received symbols, so any corrections by a channel estimator must necessarily focus on those differences. In fact, the reason to provide estimates of differentials is because differential modulation is used. Wi-LAN provides no explanation for why the patent would require estimating differentials if differential modulation were not used.

2. Wi-LAN's Construction Seeks To Write The "Differential" Requirement Out Of The Claim And Conflicts With The Evidence

Wi-LAN improperly removes the word "differential" from the claims and substitutes an entirely different word, which is also used in the patent – "distortion". However, contrary to Wi-LAN's assertions, neither the '222 patent nor the applicants' '670 patent ***ever*** refers to a "differential" as "distortion." *See* Br. at 7. ***None*** of Wi-LAN's citations to the specification equate a "differential" with "distortion." *See id.* at 7–12. To the contrary, estimates of "differentials" are used to *correct for* distortion over the channel:

> To reduce the effect of amplitude ***distortion*** the modulation is preferably phase modulation, while the effect of phase ***distortion*** is reduced by employing ***differential*** phase modulation. Hence the modulation may be referred to as ***Differential*** OFDM (DOFDM).

See Exh. 2 at col. 7:17–23; *see also* Exh. 5 at col. 2:66–68 ("the received signal may then be modified using the estimated phase differential to produce a corrected signal."); Abstract ("The resulting phase differential, after correction for sign ambiguity may be used to demodulate the received signal."). Accordingly, the "phase differential" of the received signal is supplied to the "pre-distorter" to *correct for "phase distortion over the channel"*:

> An estimate of the **phase *differential*** of the received signal is taken in the channel estimator 530 . . . . The estimated **phase *differential*** is also supplied to a pre-distorter 534 in the transmitter[, and] the signal being transmitted is predistorted with the estimated **phase *differential*** so that the received signal . . . will be corrected for any **phase *distortion*** over the channel.

See Exh. 2 at col. 9:43–61. Wi-LAN's expert admitted to the difference between "differentials" and "distortion" in his deposition. *See* Exh. 6 at 86:23–87:20 (the channel estimator of the '222 patent "estimate[s] the effect of the channel on the difference between the values of the phase of the information symbols."), 106:13–19 ("So the pre distorter…receives the phase difference values due to the channel…and it removes the distortion."). Wi-LAN provides no explanation for why, under its approach, the applicants would have used two different terms ***in the same sentence*** to mean the same thing. Unlike Defendants' proposed construction, which is consistent with the use of the term "differential" throughout the patent, Wi-LAN's proposed approach requires the Court to accept that "differential" is used in multiple different ways to mean several different things in the same patent. *See id.* at 98:1–6, 145:16–146:24.

Additionally, Wi-LAN's construction ignores the word "characteristics" in the claim 1, because Wi-LAN construes "amplitude and phase differential characteristics" to mean the same thing as "amplitude and phase differential." This overlooks the importance of differential modulation to the patented invention, and the well-known characteristics of signals using such modulation techniques; *i.e.*, information encoded in the differences between symbols.

Similarly, Wi-LAN's proposed construction deprives the word "differential" in the phrase "to produce . . . an estimated . . . differential" of meaning. As Wi-LAN's expert Dr. Haimovich admitted, channel estimation in general involves separating the effect of channel distortion from the data. *See* Exh. 6 at 83:9–13. In the '222 patent, channel estimation is performed by estimating the differential – *i.e.*, the difference in adjacent symbols caused by the channel. *See id.* at 86:23–87:20, 83:24–84:5, 81:10–82:19. The claims reflect this by specifically requiring that the channel estimation function is performed by estimating such

differentials. By substituting the word "differential" with "distortion," Wi-LAN eliminates this important claim limitation as well.[14]

As with its other constructions, Wi-LAN relies heavily on expert testimony to suggest that Defendants are "confusing" the concepts of differential modulation, channel distortion, and channel estimation. *See* Br. at 10–11, 17. In making this argument, Wi-LAN concedes that Defendants' definition of "differential" is correct at least with respect to differential modulation. Although Wi-LAN argues that "differential" has a different meaning in connection with channel estimation, that position is directly at odds with the applicants' definition of differential in the '670 patent to describe the '222 patent's channel estimation technique. *Se*e Exh. 5 at col. 4:3–10. As the applicants confirmed time and again, the '222 patent uses "differential" and "distortion" to mean different things. Wi-LAN's proposed construction improperly conflates those different terms, thereby writing out express limitations of the claim. *CAE Screenplates Inc. v. Heinrich Fiedler GmbH & Co.,* 224 F.3d 1308, 1317 (Fed. Cir. 2000) (". . . the use of these different terms in the claims connotes different meanings.").

D. "Channel Estimator" Terms

As discussed in Part I.B. above, the claimed channel estimator outputs an estimated difference in amplitude and phase between the received data symbols. Wi-LAN's construction fails to account for the critical aspects of this element – *i.e.*, that the channel estimator produce an estimate of an "amplitude and phase differential." Moreover, contrary to Wi-LAN's

[14] Wi-LAN's construction also conflicts with the plain claim language, which regards differentials "of the ***received signals,***" confirming that the focus of "differential" as used in the claim is on the differences between the received signals, not on distortion to a signal that was transmitted. Exh. 2 at col. 11:33–34. The long passages in Wi-LAN's brief based on expert testimony do not justify Wi-LAN's attempt to re-define "differential." *See* Br. at 7–8; Haimovich Decl. at ¶¶17–19. In fact, although Wi-LAN cites these passages for the proposition that "differential" means "distortion," none of the cited passages even mentions the term differential when discussing channel distortion. *See* Br. at 7–8.

assertions, a channel estimator may "compute" an estimated differential, but is not a device for "computing distortions." According to the claims and specification, the channel estimator "estimates" the amplitude or phase differential. *See* Exh. 2 at cols. 9:43–48 ("An estimate of the phase differential of the received signal is taken in the channel estimator 530 . . . ."), 19:32–36. Wi-LAN's proposed construction impermissibly changes the claim language without support.

E. "Transceiver"

Contrary to Wi-LAN's assertions, the claimed "transceiver" is not simply to be defined as a "two-way radio" – rather, the applicants disclaimed use of a number of components found in prior art transceivers that, according to the applicants, were not necessary when employing W-OFDM. The applicants' disclaimer of prior art transceiver components is emphasized and repeated throughout the specification. Beginning with the "Summary of the Invention," the applicants expressly distinguished the "present invention" from the prior art on the basis that it omits a number of components found in prior art transceivers:

> Advantages of the present invention include: . . . **[t]he system, as compared with prior art systems omits the clock or carrier recovery, automatic gain control or passband limiter, power amplifier, an equalizer or an interleaver-deinterleaver, and therefore has low complexity**.

See Exh. 2 at col. 2:19–23.

To underscore the importance of this aspect of the alleged invention, the "Detailed Description" begins by confirming that the alleged invention obtains the "omission" of these iteMs. *See id.* at col. 4:61–63 ("It will now be explained how the proposed system obtains the omission of these blocks without impairing the quality and capacity of the system."). The specification then proceeds to confirm, for each of the prior art items, that it is omitted from the alleged invention, and why that is possible. *See id.* at cols. 12:45–13:64. To further illustrate this important requirement, the '222 patent contrasts a prior art transceiver in Figure 1 with the

claimed transceiver in Figure 5 to demonstrate that the components at issue are omitted. *See id.* at cols. 12:45–50 (comparing Fig. 1 with Fig. 5), 4:44–61.

According to the Federal Circuit, where, as here, the specification makes clear that the alleged invention does not include particular items, those items are outside the scope of the claiMs. *See, e.g.*, *SciMed Life Sys., Inc. v. Adv Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1341 (Fed. Cir. 2001) ("Where the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question."); *Astrazeneca AB v. Mutual Pharm. Co*., 384 F.3d 1333, 1340 (Fed. Cir. 2004). Further, a patentee cannot recapture prior art alternatives that are disclaimed in the patent specification. *See, e.g*., *L.B. Plastics, Inc. v. Amerimax Home Prods., Inc.*, 499 F.3d 1303, 1309 (Fed. Cir. 2007).

Contrary to Wi-LAN's assertions, these repeated statements in the specification are an express disavowal of claim scope, rather than optional advantages. *See SciMed*, 242 F.3d at 1341; *Astrazeneca,* 384 F.3d 1340; *L.B. Plastics*, 499 F.3d at 1309. The specification goes to lengths to describe how the proposed "system" obtains the omission of these components. *See, e.g.,* Exh. 2 at cols. 4:61–63, 12:45–13:64. Furthermore, the applicants' description of a system that omits particular elements as "the present invention" indicates an intent to limit their invention accordingly. *See Edwards Lifesciences LLC v. Cook Inc.,* 582 F.3d 1322, 1330 (Fed. Cir. 2009); *SciMed*, 242 F.3d at 1343. Moreover, the applicants used this aspect of the system to distinguish the prior art. *See, e.g., id.* at cols. 2:19–23, 4:44–61. In such circumstances, applicants may not later take back the distinctions they used to obtain the patent. *See L.B. Plastics*, 499 F.3d at 1309. Wi-LAN's authority on this issue confirms these same principles, but

reaches a different conclusion on facts readily distinguishable from those presented here. *See Playtex Prods, Inc. v. Proctor & Gamble Co.*, 400 F.3d 901, 908 (Fed. Cir. 2005) (finding a claim construction improper that deviated from the "unambiguous meaning" in the intrinsic record and instead relied on expert testimony.).

Contrary to Wi-LAN's assertions, the claims do not require the use of any of the omitted components. *See* Br. at 6. Although claim 3 requires "a power controller," the specification distinguishes that component from the omitted automatic gain control. According to the specification, automatic gain control may be omitted *because of* the presence of the power controller. *See, e.g.*, Exh. 2 at col. 13:29–44 ("Neither an AGC nor a Passband hard-limiter are required since the level of the received power may be controlled constantly . . . the degree of power control may be determined using the power controller 525."). The specification never equates automatic gain control (which is omitted) with the power controller (which is not omitted). Wi-LAN's only support for its contentions is the incorrect testimony of its expert. *See* Haimovich Decl. at ¶51; Br. at 5–6.[15]

F. "The Second Transceiver Has A Maximum Expected Clock Error χT, Where T Is The Duration Of One Time Domain Sample, The Information Is Multiplexed Over A Number M Of Levels, And K1 Selected Such That $2\pi\chi/K1<\pi/M$"

The final element of claim 7 includes a number of mathematical terms and phrases which require construction. Wi-LAN does not provide constructions for most of these terms, and

[15] Similarly, contrary to Wi-LAN's assertions, the disclaimed power amplifier and interleaver-deinterleaver are not included in any claims or embodiments of the claimed system. *See* Br. at 6. Wi-LAN relies on excerpts from the specification for its argument, omitting the full passages from the specification which unequivocally confirm that the power amplifier and interleaver-deinterleaver are not required. *See* Exh. 2 at col. 12:51–62 ("From the BS point of view, the interleaver-deinterleaver is not required"), col. 12:67–13:1 ("It is important to avoid using a PA since DOFDM generates a time domain signal with a non constant envelope").

proceeds as if they are not limitations on claim 7. By contrast, Defendants offer constructions based on express definitions for the terms in the specification.

The parties appear to agree that the phrase "a number of M levels" in the context of claim 7 refers at least to the use of a phase modulation technique.[16] *See* Br. at 21–22. The parties disagree on Defendants' contentions that (1) by using the term "$2\pi\chi/K1$," claim 7 further requires the use of differential modulation; (2) "a number of M levels" refers to "multilevel" modulation; and (3) T was expressly defined in the specification to be "equal to $1/(K_1\Delta f)$."

With respect the first issue, the specification expressly defines the claim term "$2\pi\chi/K1$" as a "phase difference between adjacent symbols." *See* Exh. 2 at col. 6:2–4. As explained above, this is a well-known reference to "phase differential" used in differential modulation. *See* Part I.B., above. The applicants confirmed the centrality of differential modulation to the alleged invention throughout the intrinsic record. *See* Part II.C.1. Although Wi-LAN contends that Defendants "import limitations . . . from an embodiment" (Br. at 21), Wi-LAN provides no opposing construction for the "$2\pi\chi/K1$" term nor provides any explanation of that term in its brief, as if it is not a limitation on claim 7. Paradoxically, Wi-LAN concedes that claim 7 requires use of *phase* modulation, but ignores the remaining limitations of claim 7 requiring *differential* modulation. *See* Br. at 21–22. Because the applicants expressly defined "$2\pi\chi/K1$" in the specification to place a requirement on the claims that would only be relevant in a system using differential modulation, Defendants' unopposed construction is correct. *See CytoLogix v. Ventana Med. Sys.*, 424 F.3d 1168, 1173 (Fed. Cir. 2005).

[16] The parties also agree on the definition of the term "χ," which is defined in the specification as "a real value that when multiplied by the duration of one time domain sample provides the maximum expected clock error." *See* Exh. 7.

With respect to the aspect of Defendants' proposed construction requiring "multilevel" modulation, the '222 patent states the "a number of M levels" refers to "multilevel" modulation (*e.g.,* "Multilevel Differential Phase Shift Keying" or "MDPSK"). *See, e.g.*, Exh. 2 at cols. 5:31–35, 6:34–46. With respect to the term "T," the applicants expressly state that "T is equal to $1/(K_1\Delta f)$." *See id.* at col. 6:2–4. As with "2πχ/K1," Wi-LAN does not propose a construction for this term.

G. "Points" And "Tail Slots"

The patent expressly defines "points" as divisions within a frame corresponding to one information symbol each. In describing wideband OFDM, the specification states that the "available bandwidth B is divided into a number of points K," that "K points are grouped into a frame of K_1 points and two tail slots of K_2 points each," and that "each point in the frame corresponds to one information symbol." *See* Exh. 2 at col. 5:25–36. Figure 2 confirms that each point is equal to one symbol. *See id.* Fig. 2 ("1 pt . . . = 1 D8PSK symb."). The parties agree that "tail slots" act as guard bands. *See* Br. at 19; Exh. 1; Exh. 2 at col. 5:36–37. Moreover, the specification states that both K1 points and tail slots of K2 points are grouped into a frame. *See* Exh. 2 at col. 5:28–31.

H. "The Method Of Claim 7 In Which K2 Is Selected So That The Out Of Band Signal Is Less Than A Given Level"

The phrase "less than a given level" in claim 9 fails to particularly point out the scope of the claim as required under § 112(2), and is thus indefinite. *See* 35 U.S.C. §112(2); *PureChoice, Inc. v. Honeywell Int'l,* 333 Fed Appx. 544, 548 (Fed. Cir. 2009). Because the "level" in the claim is unspecified, no meaningful bound is placed on the patent claim. *See* Acampora Decl. at ¶40. The specification does not provide any guidance as to the scope of the claim, stating only

that the "out-of-band signal is below a certain power level." *See* Exh. 2 at col. 5:36–38. Wi-LAN confirms the lack of meaning by failing to provide a proposed construction.

III. OVERVIEW OF THE '802 PATENT

A. Background To The Alleged "Multi-Code DSSS" Invention

The alleged invention of the '802 patent is called "Multicode Direct Sequence Spread Spectrum" ("MC-DSSS") and generally concerns the use of multiple codes to transmit information bits. *See* Exh. 15 at Title, col. 2:6–10. According to the '802 patent, Multicode Direct Sequence Spread Spectrum is based on a well-known prior art communications scheme called Direct Sequence Spread Spectrum ("DSSS"). *See* Exh. 15 at col. 2:6–10; Declaration of Dr. Proakis in Support of Defendants' Responsive Claim Construction Brief ("Proakis Decl.") at ¶20. To describe the prior art DSSS technique, the '802 patent cites Chapter 8 of *Digital Communications* by John G. Proakis ("Proakis"), a book widely regarded as an authority on DSSS and other communications schemes.[17] *See id.* at ¶ 15. As explained in the '802 patent, in DSSS, information bits are spread over DSSS codes to produce modulated data symbols. *See* Exh. 15 at col. 1:25–27 ("DSSS is a communication scheme in which information bits are spread over code bits (generally called chips)."); Exh. 10 at 802–03; Proakis Decl. at ¶8.

As the '802 patent confirms, a well-known and fundamental characteristic of DSSS is that DSSS codes are pseudo-random noise sequences.[18] In the opening paragraph of the

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[17] Chapter 8 of Proakis is listed as prior art on the face of the '802 patent, and therefore it constitutes intrinsic evidence for purpose of claim construction. *V-Formation, Inc. v. Benetton Group SPA*, 401 F.3d 1307, 1311 (Fed. Cir. 2005); *Kumar v. Ovonic Battery Co.*, 351 F.3d 1364, 1368 (Fed. Cir. 2003); *Collins, Inc. v. Northern Telecom Ltd.*, 216 F.3d 1042, 1045 (Fed. Cir. 2000).

[18] As the applicants stated during prosecution, "random" or "randomized" signals or codes in the art are actually "pseudo-random" or "pseudo-randomized" – *i.e.,* near approximations of perfectly random signals. *See* Exh. 16 at Feb. 12, 1996 Response to Office Action at 1–2 (W0002259–60). Thus, according to the applicants, the use of the term "random" in the '802 patent refers to "pseudo-random." *See id.*

Background section, the '802 patent states that in DSSS, noise-like codes called pseudo-random noise sequences are used to spread information bits:

> Commonly used spread spectrum techniques are Direct Sequence Spread Spectrum (DSSS) and Code Division Multiple Access (CDMA) **as explained in Chapter 8 of "Digital Communication" by J. G. Proakis, Second Edition, 1991, McGraw Hill, DSSS is a communication scheme in which information bits are spread over code bits (generally called chips). It is customary to use noise-like codes called pseudo random noise (PN) sequences.**

See Exh. 15 at col. 1:21–28. Proakis, referenced as intrinsic evidence, confirms that pseudo-random noise sequences are among the "basic elements" of spread spectrum systems:

> The block diagram shown in Fig. 8.1.1 illustrates **the basic elements of a spread spectrum digital communications system. . . .** [W]e have two identical **pseudo-random pattern generators . . . *The generators generate a pseudo-random or pseudo-noise (PN) binary-valued sequence*** which is impressed on the transmitted signal at the modulator and removed from the received signal at the demodulator.

See Exh. 10 at 802; *see also id*. at 800 ("**A second important element employed in the design of spread spectrum signals *is pseudo-randomness***, which makes the signals appear similar to random noise."). Engineers in the art uniformly confirm this basic understanding of DSSS, as does an article by one of the applicants:

> ***All*** spread spectrum techniques use a repeating **pseudo-random sequence to spread the spectrum of the data signal** to be transmitted. **One of the most popular spread spectrum methods is called 'direct sequence'. In this technique, each baud *b*(*t*) of the data signal is multiplied by the *pseudo-random code sequence p(t)* . . . .**

See Exh. 17 at 364. In fact, according to the applicant's article, DSSS's use of pseudo-random codes ***is what causes*** the fundamental "spreading" feature of DSSS systems:

> [The pseudo-random code sequence] is a periodic sequence which is divided into *n* chips (or bits), and the chip time *c* of the sequence is such that *n* x *c* is equal to the baud time *T* of the data signal. **This procedure, in effect, changes the baud pulse shape to that of the *pseudo-random code sequence*, thereby widening the spectrum of the data signal.**

See id. at 364–65. Consistent with this background, the ’802 patent recognizes various advantages inherent in DSSS as a result of using pseudo-random codes. *See* Exh. 15 at col. 1:31–47; Exh. 10 at 800–01; Proakis Decl. at ¶16.

According to the ’802 patent, prior art DSSS systems were limited in the throughput they could provide. *See* Exh. 15 at col. 1:48–49. In particular, in any given frequency bandwidth “B”, use of a DSSS code of length “N” (*i.e.,* having “N” chips) to spread an information bit will reduce the effective bandwidth by a multiple equal to the number of chips, or B/N:

> An obvious limitation of DSSS systems is the limited throughput they can offer. In any given bandwidth, B, a code of length N will reduce the effective bandwidth to B/N.

See id. at col. 1:48–50.

To address this limitation of DSSS, the ’802 patent presents a form of DSSS, called “Multi-Code Direct Sequence Spread Spectrum” or “MC-DSSS.” *See id.* at col. 2:6–10. Like prior art DSSS systems, Multi-Code DSSS spreads information bits over DSSS codes having N chips each. *See id*. However, unlike traditional DSSS, which assigns one code to each user, Multi-Code DSSS assigns up to N codes to an individual transceiver, defining “N” as the number of chips per code:

> **In this patent, we present Multi-Code Direct Sequence Spread Spectrum (MC-DSSS)** which is a modulation scheme **that assigns up to N codes to an individual transceiver where N is the number of chips per DSSS code.**

See id. at col. 2:6–10. By assigning multiple codes to each individual transceiver, the ’802 patent claims to overcome the reduction in effective throughput associated with traditional DSSS. *See id.* at col. 1:66–2:5 (**“To enhance the throughput, we allow a single link (i.e., a single transceiver) to use more than one code at the same time.”**); col. 2:19–34; Br. at 28; Gitlin Decl. at ¶17.

B. Summary Of The ’802 Patent’s Claimed Apparatus And Method

The ’802 patent includes three independent apparatus claims (claims 1, 17 and 33), and one independent method claim (claim 23), all of which are asserted along with 20 dependent claims. *See* Exh. 7. All three independent apparatus claims include three elements necessary to achieve MC-DSSS: (1) a converter for converting a first stream of data symbols into plural sets of N data symbols each; (2) a “first computing means” using DSSS codes to produce modulated data symbols corresponding to an “invertible randomized spreading” of the first stream of data symbols; and (3) a means to combine the modulated data symbols.[19] Figure 1 of the ’802 patent includes items corresponding to each of these elements:

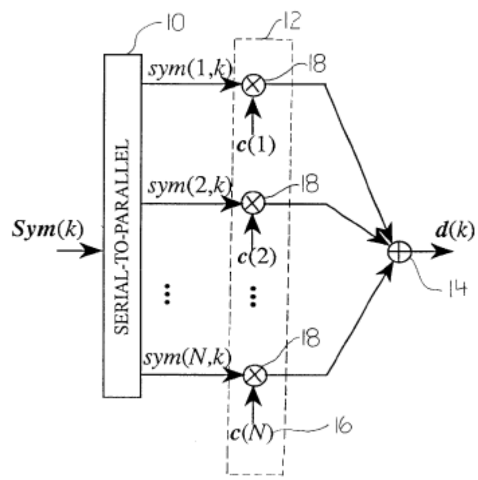

FIGURE 1

As shown in Figure 1, a serial stream of data symbols Sym(k) are input into a serial-to-parallel converter (item 10) for converting the serial stream of data symbols into sets of N data symbols. *See* Exh. 15 at cols. 2:36–40, 4:1–2. Each of the N data symbols (from symbol 1 to symbol N) are then input in parallel into the first computing means (item 12) for spreading over a different DSSS code (codes c(1) to c(N)). *See id.* at cols. 2:36–40, 4:2–5. Because the

[19] The single method claim (claim 23) contains similar elements.

DSSS codes are pseudo-random codes, the computing means produces modulated data symbols corresponding to an "invertible randomized spreading" of the first stream of data symbols. *See id*. Additionally, because multiple DSSS codes are used in an individual transceiver, the patent at times refers to the DSSS codes used in its MC-DSSS scheme as "MC codes." *See, e.g., id.* at Abstract. Lastly, the modulated data symbols are combined by a combiner (item 14) for transmission. *See id.* at col. 4:5–7.[20]

To reflect the importance of using pseudo-random noise sequences in MC-DSSS, every claim requires the use of DSSS codes, either by expressly reciting DSSS codes in the claim language of both apparatus and method claims, or by defining DSSS codes as part of the corresponding structure for the "computing means" means-plus-function elements in the apparatus claiMs. *See id.* at Claims 1, 17, 23, 33; Parts IV.A.–B., below.

C. The Reissue Application And The Applicants' Change To "Up To M" Codes Having "M" Chips

The '802 patent is a reissue of U.S. Patent No. 5,555,268 (the "'268 patent"). During reissue, the applicants amended the claim language to change the number of chips per code from "N" to "M". According to the applicants' reissue declarations, in the claims and specification of the original '268 patent, "N" referred to three items: (1) the number of data symbols in each set of data symbols; (2) the number of chips per DSSS code; and (3) the maximum number of codes:

> In the claims and detailed description of the original patent, **N is the number of data symbols** in each data set. In the detailed description and in the summary of the original patent, **N is also used in reference to the number of chips per direct sequence spread spectrum code** and the maximum number of codes.

[20] Figure 2 of the '802 patent, which is a schematic for a receiver for implementing MC-DSSS, has similar elements, including a "second computing means" (item 24) for operating on a "second stream of data symbols" to produce an estimate of the second stream of data symbols. *See* Exh. 15 at col. 4:22–28.

See Exh. 18 (Sept. 1998 Reissue Decl.) at ¶6; *see also* Exh. 15 at cols. 2:6–9, 4:1–12. Consistent with this arrangement, the claims of the original '268 patent required a fixed numerical relationship between the sets of data symbols, the maximum number of DSSS codes, and the number of chips per code: they are all "N". *See, e.g.*, Exh. 19 at Claim 17; Exh. 18 (Sept. 1998 Reissue Decl.) at ¶6. Likewise, every embodiment in the specification explicitly requires sets of N data symbols and N DSSS codes having N chips per code. *See, e.g.*, Exh. 15 at Figs. 1–5, cols. 2:6–15, 2:36–67, 4:1–46.

In requesting reissue, however, the applicants asserted that the claimed "N data symbols/codes/chips-per-code" arrangement was in error, arguing that the number of codes and chips per code could be a different number – referred to as "M" – than the number of data symbols. *See* Exh. 18 (Sept. 1998 Reissue Decl.) at ¶6 ("Although M equals N in the detailed description . . . this is not necessary"). Accordingly, the applicants revised certain of the means-plus-function elements, deleting references to "N" chips per code, and substituting a broader limitation permitting a different number of chips per code than the N data symbols in each set – *i.e.,* "M" chips per code. *See, e.g.*, Exh. 15 at Claims 2, 4, 12, 17–18, 21, 23–24, 30. Although the applicants altered the ***functional*** language of these means-plus-function elements, the applicants left the corresponding structures in the specification untouched, which the applicants ***admitted only show codes having N chips.*** *See* Exh. 18 (Sept. 1998 Reissue Decl.) at ¶6. As discussed below, this leaves the means-plus-function elements having "M" chips per code unsupported by corresponding structure, thus rendering them invalid under 35 U.S.C. § 112.

IV. CONSTRUCTION OF THE DISPUTED TERMS IN THE '802 PATENT[21]

A. "Direct Sequence Spread Spectrum Codes" (DSSS Codes)

1. Defendants' Construction Is Supported By The Evidence

As is known in the art, and as the '802 patent and the Proakis chapter referenced to describe DSSS confirm, DSSS codes are pseudo-random noise sequences over which information is spread. In the opening paragraph of the Background section, the '802 patent states that in DSSS, noise-like codes called pseudo-random noise sequences are used to spread information bits. *See* Exh. 15 at col. 1:21–28. Chapter 8 of the Proakis reference – which is part of the intrinsic record – confirms that pseudo-random noise sequences are among the "basic elements" of spread spectrum systems. *See* Exh. 10 at 802. According to Proakis, the "pseudo-randomness" of DSSS signals is an "important element" of DSSS and is "intimately related" to the purpose of such signals:

> **A second important element employed in the design of spread spectrum signals is pseudo-randomness**, which makes the signals appear similar to random noise and difficult to demodulate by receivers other than the intended ones. ***This element is intimately related with the application or purpose of such signals.***

See id. at 800. This fundamental aspect of DSSS is confirmed throughout the Proakis reference, in its discussion of how DSSS codes are generated, *id.* at 831–36, the properties of DSSS codes, *id.* at 832, and the potential applications of DSSS, *id.* at 817–23. Consistent with this background, the '802 patent recognizes various advantages inherent in DSSS as a result of using pseudo-random codes. *See* Exh. 15 at col. 1:31–45 (DSSS allows a signal to be "buried in noise," transmitted at "low power," and recovered over interference); Exh. 10 at 817–23

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[21] In *Wi-LAN, Inc. v. Acer, Inc.* et al. and *Wi-LAN, Inc. v. Westell Tech., Inc.* et al., Wi-LAN asserts 22 claims (claims 1, 4–5, 10, 12–14, 17, 20–25, 29–31, 33–34, and 36–38). Additionally, in *Wi-LAN, Inc. v. Research in Motion Corp.* et al., Wi-LAN asserts these same 22 claims as well as claims 2 and 18.

(confirming same); Exh. 15 at col. 1:25–31 (linking the autocorrelation and cross correlation properties of PN sequences to the advantages of DSSS); Exh. 10 at 832–33 (same); *see also* Proakis Decl. at ¶16.

The literature concerning DSSS at the time of the application is uniformly in accord with Defendants' proposed construction. For instance, one of the applicants of the '802 patent – listed inventor Michel Fattouche – confirmed that "***[a]ll*** spread spectrum techniques use a repeating pseudo-random sequence to spread the spectrum of the data signal to be transmitted." *See* Exh. 17 at 364–65. This statement is particularly important because Mr. Fattouche made it in 1997, ***after the '268 patent precursor to the '802 patent issued,*** and thus necessarily included the '268 patent in Mr. Fattouche's description of "all" spread spectrum techniques. Like Mr. Fattouche, engineers in the art at the time uniformly understood DSSS to refer to the use of pseudo-random codes. *See* Exh. 20 (numerous references at the time of the filing of the '268 patent showing DSSS codes as PN codes). The publications of Wi-LAN's experts confirm that DSSS codes are PN sequences. *See* Exh. 21 (Richard D. Gitlin et al., IS-95 Enhancements for Multimedia Services, Bell Labs Technical Journal (Autumn 1996)) at 63 (showing a "direct-sequence spreader" using "randomized spreading codes"); Exh. 22 (Li Zhao, Alexander M. Haimovich, & Haim Grebel, *Performance of Ultra-Wideband Communications in the Presence of Interference*, IEEE Int'l Conf. on Comm. (2001)) at 2948 ("With traditional DS-SS, the wide bandwidth is achieved by modulating the data message with a pseudo-noise (PN) sequence.").

The claim language itself supports Defendants' proposed construction by requiring that DSSS codes be pseudo-random noise sequences. Each of the independent apparatus claims includes a means-plus-function element requiring a computing means to produce modulated data symbols corresponding to an "invertible randomized spreading." *See* Exh. 15 at Claims 1, 17,

and 33. The parties agree that the computing means in Figure 1 is corresponding structure to this function, and that according to the specification, Figure 1 requires the use DSSS codes. *See* Br. at 32, 37–38.[22] However, DSSS codes are the ***only structures*** in the computing means in Figure 1 capable of performing the claimed function of producing an "invertible randomized spreading" of the first stream of data symbols. *See* Exh. 15 at Fig. 1, col. 4:1–12; Exh. 9 at 73:10–15. If Wi-LAN's construction is adopted, and DSSS codes were ***not*** pseudo-random noise sequences, there would be nothing in the computing means of Figure 1 to perform the function of an "invertible randomized spreading" as claimed. *See* Proakis Decl. at ¶¶17–18; Exh. 9 at 87:17–88:7. Defendants' proposed construction must be correct or else the agreed-to corresponding structures for the "first computing means" will not support their claimed functions, rendering these claims invalid.

Further, during prosecution, the applicants confirmed the importance of using randomized codes, by distinguishing prior art having non-random Walsh codes from the alleged invention. *See* Exh. 16 (Aug. 28, 1995 Amendment):

> The key here is the randomization of the transformation. It is known in the art to spread symbols and spread spectrum applications, including by using Walsh codes as shown in *Albrieux* et al. ('952). However, depending upon the data, the effect might be to de-spread the symbols, generating an unwanted pulse.

See id. at 15–16 (W0002231–32). Wi-LAN attempts to co-opt this important portion of the prosecution history by improperly excerpting the sentence concerning Walsh codes, without

[22] The parties agree that the passage from the specification at col. 4:7–12 is corresponding structure for the "first computing means" elements found in the independent claims. *See* Br. at 32. According to that passage, the claimed computing means includes N DSSS codes: **The computing means shown in FIG. 1 includes a source 16 of N direct sequence spread spectrum code symbols** and a modulator 18 to modulate each ith data symbol from each set of N data symbols with the I code symbol from the N code symbol to generate N modulated data symbols, and thereby spread each I data symbol over a separate code symbol. *See* Exh. 15 at col. 4:7–12.

revealing the entire passage that distinguishes Walsh codes from the codes that provide "randomization." *See* Br. at 43; Gitlin Decl. at ¶25.

2. Wi-LAN's Construction Conflicts With The Evidence

Contrary to Wi-LAN's assertions, DSSS codes are not simply *any* codes over which information bits are spread. Wi-LAN's proposed construction gives no meaning to the DSSS aspect of DSSS codes, and ignores the substantial intrinsic evidence in the specification and Proakis reference reflecting the well-known meaning of DSSS codes in the art. Moreover, Wi-LAN provides no explanation as to how Figure 1's computing means could produce an "invertible randomized spreading" if the DSSS codes in Figure 1 were not pseudo-random noise sequences. *See* Br. at 32–34, 43–44. In fact, Wi-LAN's ***own proposed construction*** for performing the function of an "invertible randomized spreading" ***explicitly requires*** "applying complex constants chosen randomly," which, in Figure 1, could only be achieved if the DSSS codes are pseudo-random noise sequences. *See* Br. at 36. Wi-LAN's expert admitted that an "essential element" of the codes in Figure 1 is that they are randomized:

> Q. In figure 1, if the codes in item 12, the first computing means, if those codes are not randomized, could item 12 perform the function of producing an invertible randomized spreading?
>
> A. Well, an essential element is randomization. So you need to have the randomization.
>
> Q. The codes would have to be randomized, right?
>
> A. Yes.

Exh. 9 at 87:17–88:7.

Wi-LAN's contention that DSSS codes includes non-randomized "Walsh codes" ignores the "invertible randomized spreading" requirement and finds no support in the intrinsic record. To the contrary, during prosecution, the applicants confirmed that Walsh codes ***despread*** a

signal, and do not perform the function of an "invertible randomized spreading." *See* Exh. 16 at 15–16. Notwithstanding his conclusory assertions that Walsh codes can constitute DSSS codes, Wi-LAN's expert admitted to this in deposition, and conceded that the only way spreading is achieved is through the use of pseudo-random noise codes. *See* Exh. 9 at 26:22–28:17; 87:17–88:7.

Contrary to Wi-LAN's assertions, the '802 patent's use of the term "MC codes" does not change the well-known definition of DSSS codes, but rather refers to the use of multiple DSSS codes. *See, e.g.*, Exh. 15 at col. 2:3–5; Abstract ("In this patent, we present MultiCode Direct Sequence Spread Spectrum (MC-DSSS) which is a modulation scheme that assigns up to ***N DSSS codes*** to an individual user where N is the number of chips ***per DSSS code.***"). Wi-LAN's apparent contention that "MC codes" need not be DSSS codes conflicts with both the claim language requiring DSSS codes (*see, e.g.,* claim 23) and the parties' agreed-to corresponding structure for the computing means terms, which expressly requires use of DSSS codes. *See, e.g.*, Exh. 7. Consistent with the use of DSSS codes in the claims and specification to define the alleged "Multicode DSSS" invention, the applicants' statements that "in this patent, we introduce new codes, which we refer to as 'MC' codes" refers to the use of multiple DSSS codes. *See* Exh. 15 at col. 2:15–19. To the extent Wi-LAN contends the meaning of "DSSS codes" is different than the well-known meaning for that term, Wi-LAN provides no intrinsic evidence of a specialized meaning. More importantly, Wi-LAN's proposed construction does not reflect any specialized meaning, but rather deprives the term of *any* meaning, defining "DSSS codes" as nothing more than codes.

Similarly, the '802 patent's discussion of various types of transforms, such as "Fourier transforms" or "Walsh codes or transforms," does not alter the requirement that DSSS codes be

pseudo-random noise sequences. *See, e.g.*, *id.* at cols. 4:66–5:12. Wi-LAN claims that "[t]he patent refers to Fourier Transforms and Walsh codes or transforms as direct sequence spread spectrum codes." *See* Br. at 43 (citing to claims 26–28 and 4:66–5:6, as well as the '222 patent at cols.1:2–5, 2:47–50). But those citations never state that Fourier Transforms and Walsh Transforms are DSSS codes. To the contrary, Fourier and Walsh Transforms may be used in connection with Figure 3, but these transforms are not the DSSS codes themselves. *See* Exh. 15 at cols. 4:66–5:12.

B. "First Computing Means"

The parties agree that the "first computing means" elements of claims 1, 17, and 33 should be construed in accordance with 35 U.S.C. § 112 ¶6, and also agree on the construction of the claimed functions, with the exception of the term "invertible randomized spreading" in the claimed functions, which the parties have agreed to address separately. *See* Part IV.D. The parties further agree that the corresponding structure for the "first computing means" includes columns 2:6–10, 2:36–40, 2:58–62, 4:2–12, 4:35–44. *See* Exh. 1. The parties' disputes are focused on two issues: (1) Wi-LAN's contention that columns 4:66–5:12 constitutes additional structure corresponding to the claimed function; and (2) Defendants' contention that independent claim 33 and dependent claims 4, 6, and 8 – which require "M" chips per code – are unsupported by the corresponding structure the parties identified and are therefore invalid.

1. Defendants' Constructions Are Supported By The Evidence

(a) Corresponding Structure For Claims 1 And 17

The parties agree that item 12 in Figures 1 and 4 and the portions of the specification describing those elements are corresponding structure for the claimed functions.[23] *See* Br. at 32. The parties' agreed-to corresponding structures include several important features. First, the parties agree that the corresponding structure requires a computing means (item 12) that operates on "N" data symbols. *See* Exh. 17 at col. 4:2–3. Second, the parties agree that the corresponding structure requires the use of DSSS codes. *See, e.g.*, *id.* at col. 4:7–9, 4:38–39. Lastly, the parties agree that the corresponding structure includes codes having N chips. *See id.* at col. 2:6–9. Wi-LAN contends that a further passage at columns 4:66–5:12 also constitutes corresponding structure, which Defendants address below.

(b) Independent Claim 33 Is Invalid For Failure To Comply With 35 U.S.C. §112 ¶6

During reissue, applicants amended the functional language of the means-plus-function elements, deleting references to "N" codes having "N" chips per code, and substituting a broader limitation permitting a different number of codes and chips per code than the N data symbols in each set – claiming "up to M codes" having "M" chips per code. *See* Exh. 15 at Claim 33. However, although the applicants altered the ***functional*** language of these elements, the applicants left the specification untouched, including the ***structures corresponding to the claimed functions***, which the applicants admitted only show codes having N chips.

As discussed above, the parties' agreed-to structures corresponding to the "first computing means" require a fixed numerical relationship between the number of data symbols, the maximum number of codes, and the number of chips per code – *i.e.,* they are all "N." ***Every***

[23] The parties agree that figures 1 and 4 provide alternate structures for the claimed transmitter, and each include a computing means (item 12). *See* Br. at 32–33. Defendant LG Electronics Mobilecomm U.S.A., Inc. ("LGEMU") cites additional structure: Fig. 3 and cols. 2:54–57; 4:29–39; 4:66–5:7.

embodiment in the patent is explicitly restricted to this fixed numerical relationship, including both the claimed transmitter (in Figs. 1 and 4 and accompanying text) and receiver (in Figs. 2 and 5 and accompanying text). *See, e.g.*, Exh. 15 at Fig. 1 and col. 2:36–40,[24] Fig. 2 and col. 2:41–45, Fig. 4 and col. 2:58–62, Fig. 5 and cols. 2:63–67, 2:6–10. Similarly, in Figure 3 – which is the code generator for DSSS codes used by the computing means in Figures 1–2 and 4–5 – DSSS codes (labeled c(i)) having N chips (chips labeled 1 to N) are generated using N-point transforms. *See id.* at col. 2:54–57. Wi-LAN's expert Dr. Gitlin confirmed during his deposition that the specification only shows structures having sets of N data symbols and N codes with N chips per code. *See* Exh. 9 at 119:18–120:2; 217:16–21; 219:12–23.

Indeed, during prosecution of the reissue application, the applicants *themselves* confirmed that, in the original '268 patent's claims and specification, the number of data symbols, maximum number of codes, and the number of chips per code chips ***are all "N"***:

> In the claims and detailed description of the original patent, **N is the number of data symbols** in each data set. In the detailed description and in the summary of the original patent, **N is also used in reference to the number of chips per direct sequence spread spectrum code and the maximum number of code.**

See Exh. 18 (Sept. 1998 Reissue Decl.) at ¶6.

Despite only providing for "N" data symbols and "N" chips per code in the specification, the applicants broadened the claimed functions through reissue to a computing means with "M" chips per code. *See, e.g.,* Exh. 15 at Claim 33. As explained, the specification is devoid of any structure corresponding to such a function. Hence, the claims fail to meet the requirements of

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[24] The description of Figure 1 in the specification contains a typographical error concerning the number of chips per code. *See* Exh. 15 at col. 2:36-40 ("where c(i)=[c(1,i) c(2,i)] is the ith code"). When the original application for the '268 patent was filed the descriptions for the figures were provided on the same sheets as the figures themselves. According to the descriptions in the original application, Figure 1 explicitly requires N chips per code. *See* Exh. 16 (Original Application at Figure 1) ("where c(i)=[c(1,i) c(2,i) . . . **c(N,i)**] is the ith code"). A clerical error may have occurred when the descriptions corresponding to the drawings in the original application were moved from the sheets with the figures to the specification in column 2.

§ 112 ¶6 and are invalid. *See Default Proof Credit Card Sys., Inc. v. Home Depot U.S.A., Inc.*, 412 F.3d 1291, 1299 (Fed. Cir. 2005); *B. Braun Med., Inc. v. Abbott Labs.*, 124 F.3d 1419, 1424 (Fed. Cir. 1997); *Valmont Indus., Inc. v. Reinke Mfg. Co.*, 983 F.2d 1039, 1042 (Fed. Cir. 1993). In fact, the only way Claim 33 could be valid is if "M" in that claim were construed to be equal to "N." However, the Court need not revise the claims to make up for the applicants' failure to meet §112's requirements. *See, e.g.*, *Rhine v. Casio, Inc.*, 183 F.3d 1342, 1345 (Fed. Cir. 1999).

(c) Dependent Claims 2, 4 And 12 Are Invalid For Failure To Comply With 35 U.S.C. §112 ¶6

Dependent claims 2, 4, and 12 – which all depend from independent claim 1 – provide additional limitations for the first computing means, including "a source of . . . .direct sequence spread spectrum codes," a "transformer for operating," and a "correlator for correlating."[25] During reissue, the applicants amended each of these elements to require "M" chips per code in the computing means. *See* Exh. 15 at Claims 2, 4, 12. As discussed above, these dependent claim elements are invalid because the specification does not provide structure corresponding to the "M" chips per code function.

Although Wi-LAN contends these dependent claim limitations are not subject to §112 ¶6, that does not change the result. *See* Br. at 39–42. The parties agree that the structure corresponding to claim 1's "first computing means" function is limited to a set of "N" data symbols, and codes having "N" chips per code. *See id.* at 32–33. Dependent claims 2, 4, and 12 are broader than claim 1, by doing away with the fixed numerical relationship between the number of data symbols and chips per code. *See* Exh. 15 at Claim 2, 4, 12. To the extent dependent claims 2, 4, and 12 provide sufficient additional structure such that they are not

[25] Wi-LAN discusses each of these terms in separate sections of its brief. *See* Br. at 39–42. Because, as discussed below, these terms each violate § 112 for the same reason, Defendants address them collectively in this section.

subject to §112 ¶6, they would still be invalid because they would violate a fundamental rule of claim drafting – *i.e.*, that dependent claims ***may never be broader*** than the independent claims from which they depend. *See* 35 U.S.C. § 112, ¶4; *see also Pfizer, Inc. v. Ranbaxy Labs. Ltd.*, 457 F.3d 1284, 1292 (Fed. Cir. 2006); *AK Steel Corp. v. Sollac and Ugine*, 344 F.3d 1234, 1242 (Fed. Cir. 2003).

2. Wi-LAN's Proposed Constructions Conflict With The Evidence

As discussed above, the parties agree on the claimed function for the "first computing means," and nearly all of the corresponding structure with three exceptions. First, Wi-LAN's addition of column 4:66–5:12 as corresponding structure to the computing means of Figure 4 is incorrect. In that passage, the '802 patent provides a list of transforms which may be used by the code generator in Figure 3, *not* a description of the computing means in Figure 4. *See* Exh. 15 at cols. 4:66–5:12. Although the specification states that the transmitters in Figures 1 and 4 use the *codes* generated by the code generator in Figure 3, the specification clearly links only the computing means 12 in Figures 1 and 4 to the claimed function, not the code generator in Figure 3. *See* Exh. 2 at col. 4:2–5.[26]

Second, contrary to Wi-LAN's assertions, the corresponding structure does not include "a computing device programmed to perform the algorithms disclosed by the foregoing." *See* Br. at 33–34. Wi-LAN provides no support in the specification for this additional statement, and relies exclusively on expert testimony. *See id.* The knowledge of those skilled in the art may not be

[26] To the extent Figure 3 is found to be linked to the computing means function, the corresponding structure should not only include the passage at columns 4:66–5:12, but all of Figure 3 as well as the text describing Figure 3 at column 4:29–34. Wi-LAN's selective addition of only the text at columns 4:66–5:12 is improper and is inconsistent with its position that the description of Figure 3 is corresponding structure. *Default Proof*, 412 F.3d at 1298-99. Defendant LGEMU takes this approach, proposing Figure 3 and the accompanying text as additional corresponding structure. *See* Exh. 7. Contrary to Wi-LAN's assertions, defendant LGEMU does not agree with Wi-LAN's corresponding structure, as Wi-LAN omits Figure 3 and most of the accompanying text, and only selectively includes one passage relating to Figure 3.

used as a substitute for providing structure in the specification. *Blackboard, Inc. v. Desire2Learn, Inc.*, 574 F.3d 1371,1385 (Fed. Cir. 2009).

Lastly, Wi-LAN's addition of "equivalents thereof" merely recites the statutory language of §112 ¶6 and does not itself constitute corresponding structure. *See* 35 U.S.C. §112 ¶6. This aspect of the means-plus-function claim elements may be accounted for in jury instructions and is not a necessary part of the corresponding structure. *See, e.g.*, *Positive Techs Inc. v. Toshiba America Consumer Prods. LLC*, No. 2:07-CV-67, 2008 WL 2627687, at *6 (E.D. Tex. July 1, 2008) (Ward, J.); *Biax Corp. v. Intel Corp.*, No. 2:05-CV-184, 2007 WL 677132, at *4 (E.D. Tex. Mar. 1, 2007) (Ward, J.) (same).

C. "Spreading"

1. Defendants' Construction Is Supported By The Evidence

The term "spreading" in the '802 patent refers to distributing information bits over code bits, which increases the bandwidth of the signal and results in a reduction of effective bandwidth. This is a well-known technique underlying the alleged MC-DSSS invention. The opening paragraph of the specification confirms that "spreading" refers to distributing information bits over codes bits called "chips." *See* Exh. 15 at col. 1:21–28. The patent further confirms that "spreading" reduces the effective bandwidth of the system. *See id.* at col. 1:49–51. Defendants' construction of "distributing information bits over code chips, thereby reducing the effective bandwidth" captures both of these well-known aspects of "spreading." The Proakis reference cited in the '802 patent (*see id.* at col. 1:21–28) and the prior art listed on the '802 patent confirm these basic characteristics of spreading. *See, e.g.*, Exh. 24 at 768. Even the extrinsic publications Wi-LAN relies upon confirm Defendants' construction. *See, e.g.*, Wi-LAN's Br. Exh. P at 1057 (confirming that spreading increases the bandwidth of the information content); Wi-LAN's Br. Exh. C at 1265–66 (same).

Contrary to Wi-LAN's assertions, there is absolutely no evidence in the specification that the applicants intended to provide "spreading" with a special meaning differing from the ordinary meaning the applicants adopted. *See Multiform Desiccants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1477 (Fed. Cir. 1998) ("[S]pecial meaning[s] . . . must be sufficiently clear in the specification that any departure from common usage would be so understood by a person of experience in the field of the invention."); *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Instead, the specification expressly defines spreading in terms of its well-known meaning to those of ordinary skill. *See* Exh. 15 at col. 1:49–51.

Defendants' proposed construction does not, as Wi-LAN claims, exclude the preferred embodiment where the number of codes is equal to the number of chips. Br. at 35–36. The preferred embodiment purports to overcome certain limitations of conventional DSSS by using *multiple* DSSS codes for spreading, not by providing a special, new way to perform spreading. *See, e.g.,* Exh. 15 at col. 2:6–10, Figs. 1, 4. Wi-LAN's contention that "bandwidth need not be reduced" by the '802 patent's system focuses on the overall effect of the invention, not the individual spreading which occurs to each data symbol. The claims confirm that "spreading" refers to spreading an individual data symbol over an individual code, just as in the prior art. *See, e.g., id.* at Claim 18 ("a modulator to modulate each data symbol from each set of N data symbols . . . ***and thereby spread each data symbol over a separate direct sequence spread spectrum code.***"). Lastly, the specification does not provide an embodiment "using a Fourier transform for spreading." *See* Br. at 36. Rather, according to the specification, a Fourier transform is only an example of a transform in Figure 3. *See id.* at cols. 4:66–5:7. But Figure 3 does not perform the claimed spreading. Rather, spreading is performed by the first computing means.

2. Wi-LAN's Construction Conflicts With The Evidence

Neither the intrinsic record nor Wi-LAN's extrinsic evidence support Wi-LAN's suggestion that the applicants adopted a specialized construction of "spreading" that is (to use the words of Wi-LAN's expert) "inconsistent" with the meaning to one of ordinary skill in the art – namely, that spreading involves modulating data symbols by "codes of larger bandwidth." Wi-LAN offers ***no*** supporting intrinsic evidence in its brief. Br. at 34–35. In fact, Wi-LAN concedes that its construction conflicts with the meaning of "spreading" to one of ordinary skill in the art. *See* Br. at 35; Gitlin Decl. at ¶22 ("The patent further extends the concept of spreading . . . **even though this is inconsistent with the ordinary meaning of spreading to one of skill in the art.**"); *see also* Exh. 15 at col. 1:21–28, 1:49–51. Moreover, *none* of Wi-LAN's extrinsic publications states that "spreading" involves the use of "codes of larger bandwidth." To the contrary, each of those references confirms that spreading increases the frequency bandwidth of the signal to be transmitted, without increasing the amount of information that can be contained in that signal, *i.e.*, without increasing the effective bandwidth. The result of this fundamental property of spreading is that it reduces the effective bandwidth, relative to the actual frequency bandwidth used to transmit the signal. *See, e.g.*, Wi-LAN's Br. Exh. P at 1057; Wi-LAN's Br. Exh. C at 1265–66. The codes do not have a bandwidth, and Wi-LAN provides no evidence supporting that notion.

D. "Invertible Randomized Spreading"

1. Defendants' Proposed Construction Is Supported By The Evidence

An "invertible randomized spreading" refers to spreading using a randomized transform. According to the claim language, the phrase "invertible randomized spreading" requires that the spreading function be both "invertible" and "randomized." Claim 25 explicitly confirms this by requiring that the "spreading is an invertible randomized spreading." *See* Exh. 15 at Claim 25.

Likewise, claims 1, 17 and 33 require that the "first computing means" perform the function of producing an "invertible randomized spreading."

Consistent with this claim language, Figure 1's computing means 12 uses DSSS codes (which are pseudo-random noise codes) to spread data symbols, thereby performing the claimed function of producing an "invertible randomized spreading." *See id.* at col. 2:36–40, Fig. 1. Likewise, Figure 4's computing means 12 "includes a transformer 20" to perform the claimed "invertible randomized spreading" function. *See id.* at col. 4:40–43, Fig. 4.

During prosecution, the applicants confirmed that the claimed "invertible randomized spreading" is produced by spreading using a randomized transform. According to the applicants, although non-randomized spreading was known in the art, "[t]he key" to generating an invertible randomized spreading was the "randomization of the transformation." *See* Exh. 16 at Feb. 12, 1996 Response to Office Action at 1–2 (equating an "invertible randomized spreading" with a "randomized," "randomizer," or "randomizing" "spreading **<u>or</u>** transform").

Contrary to Wi-LAN's assertions, Defendants' proposed construction does not suggest that randomizing, in the abstract, is the same as spreading. Br. at 36–37. Rather, Defendants provide independent meanings to those terms – something Wi-LAN's construction fails to do. *Compare* "spreading" construction ("distributing information bits over code chips thereby reducing the effective bandwidth") *with* "invertible randomized spreading" ("spreading using an invertible randomized transform"). However, when it comes to an "invertible randomized spreading," the claim language explicitly requires that the spreading ***be*** randomized. As Wi-LAN's expert conceded, ***all three functions*** – spreading, randomization, and invertibility – are performed as part of the claimed spreading:

> Well, the codes themselves are characterized as invertible randomized spreading codes. So the codes include more than one function. ***They include a spreading***

> ***function, they include a randomization, or randomize function, and in concert together they are invertible.***

See Exh. 9 at 76:25–77:6. According to Wi-LAN's expert, randomization is an "essential aspect" in producing the claimed spreading codes. *See id.* at 77:11–14 ("randomization is an essential aspect -- the word 'randomized' is in the phrase, so that's part of the ingredient in producing these codes.").

2. Wi-LAN's Proposed Construction Conflicts With The Evidence

In contrast to the claim language requiring that the spreading function be "invertible" and "randomized," Wi-LAN's proposed construction incorrectly separates "spreading" from the "invertible" and "randomization" parts of the function. *See* Br. at 36 ("spreading ***and*** applying complex constants chosen randomly"). As such, Wi-LAN's proposed function is in conflict with the express claim language and cannot be sustained. This is also inconsistent with the agreed-to structures in the specification corresponding to the "invertible randomized spreading" function, which use codes to perform both spreading ***and*** randomization. *See* Exh. 15 at Fig. 1 (item 12 computing means), Fig. 4 (item 12 computing means); Exh. 9 at 77:2–6. Although Wi-LAN relies on the code-generator in Figure 3 and the randomizer transform in Figure 8 to argue that "randomizing is not spreading" (*see* Br. at 36–37), neither of those figures is identified by Wi-LAN as corresponding structure for performing the "invertible randomized spreading" function. *See* Br. at 32. Rather, the parties agree that the structures in those figures are *not* responsible for the "invertible randomized spreading" function. *See id.* As such, Figures 3 and 8 may not be relied on to contradict the express claim language requiring that the spreading itself be "invertible" and "randomized."

E. "Modulator To Modulate"

The "modulator to modulate" term in claim 2 is indefinite and renders claim 2 invalid. Upon reissue, the applicants modified the "modulator to modulate" to require that the claimed computing means of claim 1 "spread each ***set*** of data symbols ***over a separate code.***" *See* Exh. 15 at Claim 2. However, the structure corresponding to the computing means function in claim 1 requires that each ***data symbol*** in the set of N data symbols be spread over ***a separate code.*** *See id.* at Fig. 1. By amending claim 2 to require spreading each ***set*** of data symbols over a separate code, the applicants broadened claim 2 beyond the scope of independent claim 1, rendering it invalid. 35 U.S.C. § 112, ¶4; *see also Pfizer, Inc. v. Ranbaxy Labs. Ltd.*, 457 F.3d 1284, 1292 (Fed. Cir. 2006). The claim is also invalid because there is no structure corresponding to the "modulator for modulating" function. *See, e.g., B. Braun Med., Inc. v. Abbot Labs.*, 124 F.3d 1419, 1424 (Fed. Cir. 1997). Moreover, by spreading all of the data symbols in a set over the same code, the "multi-code" purpose of the invention would not be realized. *See* Acampora Decl. at ¶52.

Acknowledging this problem, Wi-LAN's proposed construction rewrites claim 2, changing the express claim language from spreading "each ***set*** of data symbols" to "each data symbol ***from each set of data symbols.***" However, Wi-LAN's construction conflicts with the claim language and is improper. In such circumstances, the Court should not rewrite the claims, even if to preserve their validity. *Nazomi Commc'n, Inc. v. Arm Holdings, PLC*, 403 F.3d 1364, 1368 (Fed. Cir. 2005); *Rhine v. Casio, Inc.*, 183 F.3d 1342, 1345 (Fed. Cir. 1999).

F. "Second Computing Means"[27]

[27] The parties agree that the "second computing means" elements of claims 10, 17, and 34 should be construed in accordance with 35 U.S.C. § 112 ¶6, and also agree on the construction of the claimed functions. *See* Exh. 1; Exh. 7. The parties further agree that the corresponding structure for the "second computing means" includes Figure 2 (item 24) and columns 2:41–54 and 4:21–28, but disagree on additional items included in Wi-LAN's proposed construction (the elements of Fig. 5 between the serial-to-parallel and parallel-to-serial converters, columns 2:63–
(Continued…)

Figures 2 and 5 illustrate alternate embodiments of the patented receiver. *See* Exh. 15 at col. 2:41–45, 2:63–67. According to the specification, the only structure linked to the "second computing means" function is item 24 in Figure 2. *See* Exh. 15 at col. 4:13–16, 4:44–45. The additional passages concerning Figure 2, at col. 4:13–20 and 4:44–46, generally describe the receiver, and are neither clearly linked nor necessary to performing the claimed function at issue. *See Cardiac Pacemakers, Inc. v. St. Jude Med., Inc.*, 296 F.3d 1196, 1119 (Fed. Cir. 2002). With respect to Figure 5, nothing in the specification clearly links any particular part of Figure 5 to the second computing means function. Moreover, although during prosecution the applicants added material to the specification to provide linkage for certain aspects of the figures, the applicants provided nothing with respect to Figure 5. *See* Exh. 15 at col. 4:44–63. Wi-LAN's proposal that the second computing means in Figure 5 extends between the serial-to-parallel and parallel-to-serial converters is a guess. *See id.*; *Asyst Techs., Inc. v. Empak, Inc.*, 268 F.3d 1364, 1370–71 (Fed. Cir. 2001) (finding element in patent was not corresponding structure because it was "not referred to at any point in the description" of the claim functions).

Lastly, as discussed in Part IV.B.2. above, Wi-LAN's additional language concerning "a computing device programmed to perform the algorithms disclosed in the foregoing; and equivalents thereof" is improper because it is unsupported by the specification and unnecessary.

G. "Means For Receiving"[28]

67, 4:13–20, 4:44–46, a computing device programmed to perform the algorithms disclosed in the foregoing, and equivalents thereof). *See* Br. at 45.

[28] The parties agree that the "means for receiving" elements of claims 10, 17, and 34 should be construed in accordance with 35 U.S.C. § 112 ¶6, and also agree on the construction of the claimed functions. *See* Exh. 1; Exh. 7. The parties further agree that the corresponding structure for the "means for receiving " includes Figure 2 (item 22) and column 4:18–21, but disagree on additional items in Wi-LAN's proposed construction (the corresponding element in Figure 5 (which includes the serial-to-parallel converter), Figure 20, columns 2:41–43, 2:63–64, 3:58–60, and 6:20–35). *See* Br. at 44.

The only structure clearly linked to the claimed "means for receiving" function is item 22 in Figure 2's receiver. *See* Exh. 15 at col. 4:18–21. The additional passages concerning Figure 2, at cols. 2:41–43, 2:63–64, 3:58–60, and 6:20–35, either describe the receiver as a whole, or unrelated functions of the receiver, and are neither clearly linked nor necessary to performing the claimed function at issue. *See Cardiac Pacemakers*, 296 F.3d at 1119; *B. Braun Med.*, 124 F.3d at 1424; *Northrop Grumman Corp. v. Intel Corp.*, 325 F.3d 1346, 1352 (Fed. Cir. 2003). With respect to Figure 5, nothing in the specification clearly links any particular part of Figure 5 to the second computing means function. *See id.* Similarly, Figure 20 illustrates unrelated functions of the receiver, and is neither necessary nor clearly linked to the claimed function at issue. Wi-LAN attempts to rely on expert testimony to fill in for the lack of a clear link in the specification, which, as discussed above in Part IV.B.2., is not a proper substitute for clearly linked corresponding structure. *See Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1331–32 (Fed. Cir. 2003); *see also Med. Instrumentation and Diagnostics Corp., v. Elektra AB*, 344 F.3d 1205, 1212 (Fed. Cir. 2003). In fact, Wi-LAN's expert confirmed that the structure identified by Wi-LAN is merely the received data signal and *not* the structure for receiving the data. *See* Exh. 9 at 214–15. As discussed above, Wi-LAN's additional language concerning "equivalents thereof" is unnecessary.

H. "Converter For Converting"

With respect to the "converter for converting" elements in claims 1, 17 and 33, Wi-LAN contends that these elements should not be construed in accordance with § 112 ¶6. Wi-LAN further contends that, should these elements be construed in accordance with § 112 ¶6, the corresponding structure should include, in addition to the structures Defendants propose, the additional passages at cols. 2:36–40 and 2:58–62.

Contrary to Wi-LAN's assertions, the "converter for converting" elements do not recite structure for performing the claimed functions, and are thus subject to § 112 ¶6. *See Watts v. XL Sys., Inc.*, 232 F.3d 877, 880 (Fed. Cir. 2001) ("[T]he presumption that § 112, paragraph 6 d[oes] not apply c[an] be rebutted by showing that the claim element recite[s] a function without reciting sufficient structure for performing that function."); *see also Mas-Hamilton Group v. LaGard, Inc.*, 156 F.3d 1206, 1213–15 (Fed. Cir. 1998). As an initial matter, Wi-LAN concedes that the "converter for converting" element does not include any structure for performing the function of "converting the first stream of data symbols into plural sets of N data symbols each," other than by using the single term "converter." *See* Br. at 30–31. Contrary to Wi-LAN's assertions, the term "converter" does not have a generally understood structure. Rather, the term "converter" is used in multiple different ways, and does not refer to a particular structure, within the relevant art. *See* Exh. 25 ("A device capable of converting impulses from one mode to another, such as analog to digital, or parallel to serial, or from one code to another"). In fact, the applicants used the term "converter" in different ways in the '222 and '802 patents, neither of which is the same as Wi-LAN's alleged "generally understood meaning" for that term. *Compare* Exh. 15 at col. 4:1–2 (describing serial-to-parallel converter) *to* Exh. 2 at col. 12:37–39 (describing analog-to-digital converter). Wi-LAN's selection of one of the many possible definitions for converter cannot remove the "converter for converting" element from the scope of § 112 ¶6. *See Mas-Hamilton Group*, 156 F.3d at 1213–15 (applying § 112, ¶6 to claim limitations described in terms of their function and not their mechanical structure); *see also Wireless Access, Inc. v. Research in Motion, Ltd.*, No. C-01-20600, 2001 WL 1218744, *1 (N.D. Cal. Sep. 12, 2001) (construing "converter that converts" and "converter to convert" as means-plus-function elements under § 112(6)).

Wi-LAN's additional passages proposed as corresponding structure describe the transmitter as a whole, and are neither clearly linked nor necessary to performing the claimed "converter" function at issue. *See, e.g.*, *Cardiac Pacemakers*, 296 F.3d at 1119. Additionally, as discussed in Part IV.B.2. above, Wi-LAN's additional language concerning "a computing device programmed to perform the algorithms disclosed in the foregoing; and equivalents thereof" is improper because it is unsupported by the specification and unnecessary.

I. "Transceiver"

Consistent with Defendants' construction, the '802 patent explicitly defines a transceiver as a communications "link." *See* Exh. 15 at col. 2:3–5 ("we allow a single link (i.e., a single transceiver) to use more than one code"); *see also Edwards Lifesciences LLC v. Cook, Inc.*, 582 F.3d 1322, 1334 (Fed. Cir. 2009) ("the specification's use of 'i.e.' signals an intent to define the word to which it refers"). By contrast, Wi-LAN's proposed construction ("two-way radio unit") is not supported by the specification or the understanding of one of ordinary skill in the art. [29] *See, e.g.*, Exh. 28.

J. "Means To Combine Modulated Data Symbols For Transmission"[30]

The only structure clearly linked to the claimed "means to combine" function is item 14 in Figures 1 and 4. *See* Exh. 15 at col. 4:5–7. The additional passages at column 2:36–40 and 2:58–62 are not corresponding structure for "means to combine" because they concern the transmitters in Figure 1 and 4 as a whole, and are neither clearly linked nor necessary to

[29] Defendants do not agree with Wi-LAN's attempt to construe "transceiver" as a "two way radio unit," or Wi-LAN's apparent understanding of the scope of the term "two way radio unit." The '802 patent does not refer to a transceiver as a "two way radio unit."

[30] The parties agree that the "means to combine modulated data symbols for transmission" elements of claims 1, 4, 17, and 33 should be construed in accordance with 35 U.S.C. § 112 ¶6, and also agree on the construction of the claimed functions. *See* Exh. 1; Exh. 7. The parties further agree that the corresponding structure includes Figure 1 (item 14), Figure 4 (item 14), and column 4:5–7, but disagree on items in Wi-LAN's proposed construction (Figure 4 (item 20) and columns 2:36–40, 2:58–62, 4:39–44, and 4:66–5:12. *See* Br. at 38.

performing the claimed function at issue. *See, e.g.*, *Cardiac Pacemakers*, 296 F.3d at 1119. With respect to element 20 in Figure 4, the specification expressly states that "transformer 20 [is] for operating on each set of N data symbols to generate N modulated data symbols as output." *See* Exh. 15 at col. 4:41–42. Nothing in the specification links the transformer 20 to the particular "means to combine" function at issue. *See Asyst Techs.*, 268 F.3d at 1370–71. Likewise, the passage at cols. 4:66–5:12 describes examples of transforms that may be used in connection with Figure 3's code generator, not the transmitter's combining function. *See* Exh. 15 at cols. 4:66–5:12. Wi-LAN again relies heavily on expert testimony to fill in for the lack of a clear link in the specification. Wi-LAN's addition concerning "equivalents thereof" is unnecessary.

K. "Means To Combine Output From The Second Computing Means"

The parties agree that the "means to combine output from the second computing means" element of claim 17 should be construed in accordance with 35 U.S.C. § 112 ¶6, and also agree on the construction of the claimed functions. *See* Exh. 1; Exh. 7. The parties further agree that the corresponding structure for this "means to combine" element includes the parallel-to-serial converter in Figure 2, but disagree on additional items in Wi-LAN's proposed construction (parallel to serial converter in Figure 5 and columns 2:41–54 and 2:63–67). *See* Br. at 47. As with other means-plus-function terms discussed above, Wi-LAN's additional items are neither clearly linked nor necessary to performing the claimed "combining" function at issue. *See, e.g.*, *Cardiac Pacemakers*, 296 F.3d at 1119. Wi-LAN's additional language concerning "equivalents thereof" is also unnecessary.

L. "Combining The Modulated Data Symbols For Transmission"

This dispute focuses on the final three steps of claim 23 – *i.e.,* (1) "operating on . . . data symbols to produce ***modulated data symbols***;" (2) "combining ***the modulated data symbols***"

produced in the preceding operating step; and lastly (3) "transmitting ***the modulated data symbols***." *See* Exh. 15 at Claim 23. By claiming the method in this fashion, claim 23 requires that the claimed "combining" be performed by a parallel-to-serial converter.

The '802 patent shows two types of combiners for combining modulating data symbols from the computing means – adders (shown in Figure 1) and parallel-to-serial converters (shown in Figure 4). *See, e.g.*, *id.* at Figs. 1, 4. The primary difference between the two types is that the "adder" adds the parallel series symbols together into new symbols, while the "parallel-to-serial converter" takes the parallel series of symbols and outputs them individually as a serial stream. *See id.* at Figs. 1, 4. Wi-LAN's expert confirms this distinction in the figures. *See, e.g.*, Gitlin Decl. at ¶24 ("In Fig. 1 the spread **output signal d(k) is produced as the combination of the symbols** spread by the separate codes and is accomplished by the element 14 (the adder or summer)"); *id*. ("a person of ordinary skill in the art would not interpret combiner 14 in Fig. 1 as a parallel-to-serial converter").

The combining step in claim 23 is performed by a parallel-to-serial combiner because the language of that claim explicitly requires that the same modulated data symbols exist both before and after the combining step. An adder – which Wi-LAN's expert admits would create new combined data symbols – cannot be used. *See* Gitlin Decl. at ¶24. In contrast to claim 23's combiner, the applicants required an "adder"-type combiner in other claims. *See, e.g.,* claims 14 and 15 (requiring post-combining operations to be performed on "combined modulated data symbols" rather than on "the modulated data symbols" as in claim 23).[31]

Dated: February 17, 2010 RESPECTFULLY SUBMITTED,

[31] Contrary to Wi-LAN's assertions, the means-plus-function "combiner" limitations of claims 1, 17, and 33 do not conflict with Defendants' proposed construction. *See* Br. at 48. In those claims, unlike claim 23, there are no additional elements after the combining step which would cause the claim to require a particular form of combiner.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that counsel of record who are deemed to have consented to electronic service are being served with a copy of this **DEFENDANTS' RESPONSIVE CLAIM CONSTRUCTION BRIEF** via email on February 17, 2010.

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